

PRACTICE EXERCISES

Use the discriminant to determine the nature of the solutions of each quadratic equation.

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| 1. $x^2 + 6x + 6 = 0$ | 2. $x^2 - 4x + 8 = 0$ | 3. $x^2 + 10x + 25 = 0$ |
| 4. $x^2 + 12x + 42 = 0$ | 5. $2x^2 - 8x = 14$ | 6. $2x^2 + 3x = 10$ |
| 7. $2x^2 - 20x + 24 = 0$ | 8. $2x^2 + 12x - 32 = 0$ | 9. $3x^2 - 9x = 27$ |
| 10. $2x^2 + x = 28$ | 11. $2x^2 + 23x + 26 = 0$ | 12. $x^2 - 12x + 36 = 0$ |

Describe the relation of the graph of each function to the x -axis.

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| 13. $y = x^2 + 3x + 5$ | 14. $y = x^2 + 7x - 8$ | 15. $y = x^2 - 12x + 25$ |
| 16. $y = 2x^2 + x + 28$ | 17. $y = 4x^2 - 3x - 9$ | 18. $y = x^2 + 12x - 18$ |

Use the discriminant to determine the nature of the solutions of each quadratic equation.

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| 19. $-x^2 + 2x + 5 = 4$ | 20. $-2x^2 - 7x - 5 = 0$ | 21. $2x(x + 1) + 8 = 0$ |
| 22. $(x - 3)(x + 6) + 4 = 0$ | 23. $2x^2 - 5x + 32 = 0$ | 24. $3x^2 - 5x + 5 = 0$ |

For each equation, determine the value(s) of k for which there will be only one solution.

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| 25. $4x^2 + 8x + k = 0$ | 26. $kx^2 - 4x = 2$ | 27. $2x^2 + kx + 8 = 0$ |
| 28. $3x^2 + 2kx = -4$ | 29. $kx^2 - kx + 2 = 0$ | 30. $6x^2 - 2x + k + 1 = 0$ |

31. When the discriminant is positive, the graph of the quadratic function $y = ax^2 + bx + c$ crosses the x -axis in two points. Show that the equation of the axis of symmetry of the parabola is $x = -\frac{b}{2a}$.

32. Describe the relation of the graph of each function to the x -axis.

$$y = x^2 - 4x + 3 \quad y = x^2 - 4x + 4 \quad y = x^2 - 4x + 5$$

Then graph the three functions on the same coordinate plane.

Describe the relation of the graph of each function to the x -axis.

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| 33. $y - 2 = 3x^2 - 4x$ | 34. $3x^2 = 5x + 7 + y$ | 35. $4x^2 = 4x - 22 - y$ |
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The Discriminant

Use the discriminant to determine the nature of the solutions.

1. $x^2 + 7x + 10 = 0$ _____

2. $y^2 - 8y + 2 = 0$ _____

3. $z^2 + 6z + 9 = 0$ _____

4. $x^2 + 5x + 9 = 0$ _____

Describe the relation of the graph of each function to the x -axis.

5. $y = x^2 - 5x + 4$ _____

6. $y = x^2 + 12x + 36$ _____

7. $y = x^2 + 2x + 3$ _____

8. $y = 2x^2 - 13x - 7$ _____

Use the discriminant to determine the nature of the solutions of each quadratic equation.

9. $-5z^2 + 6z - 4 = 0$ _____

10. $-4x^2 - 4x = 1$ _____

11. $(y - 5)(y + 3) = -2$ _____

12. $x(x - 11) + 30 = 0$ _____

Determine the value(s) of k for which there will be just one solution.

13. $x^2 + 10x + k = 0$ _____

14. $9y^2 - 24y + k = 0$ _____

15. $4z^2 - kz + 1 = 0$ _____

16. $x^2 + kx + 49 = 0$ _____

MIXED PRACTICE

Find the value of the discriminant for each quadratic equation. Determine the nature of the solutions. Then solve each equation.

17. $x^2 + x - 12 = 0$ _____

18. $y^2 - 18y + 81 = 0$ _____

19. $3z^2 - 2z = 6$ _____

20. $2x^2 - x = -8$ _____